INTERMOUNTAIN POWER HISTORY

Burner Thermal Redesign

Summary:
Burner assembly degradation on Unit 1 advanced rapidly during the early years of commercial generation at Intermountain. This degradation was largely the result of original equipment manufacturer (OEM) recommended air flow settings and burner register design. Following in depth analysis and testing of burner design and operational parameters; improved combustion, fuel balancing and air flow distribution hardware was installed on U1 in 1991. Since these modifications Unit 1 burner hardware integrity has met all expectations.

History
Like all other major equipment at Intermountain, boiler windbox compartments receive a routine inspection by Engineering Services at all scheduled outages. Inspections completed during 1987-89 showed increasing levels of degradation resulting from severe thermal fatigue and creep mechanisms. Concerns had been expressed to the OEM regarding excessive temperatures around the inner burner sites when the corresponding mill was out-of-service. Out-of-service settings on compartment airflow dampers had been reduced to low levels by the OEM during acceptance testing of the boiler in order to achieve contract performance levels.

By 1990, degradation of burner assemblies on Unit 1 had advanced to point of inoperability on many burners, requiring hundreds of manhours each outage just to bring the deformed burners to an inefficient state of operability. Following the outages of 1990, redesign efforts began in earnest, to evaluate boiler operational parameters and to match a burner design with these parameters to achieve the required burner thermal resistance and design life.

With the assistance of RJM, Inc,.a combustion design consultant, a burner design task force was established with IPSC and B&W, Inc. The resulting design included innovations for allowing thermal growth in the burner backplate, a serious weakness identified in the earlier burner design. Provisions were made to allow outer air register balancing with field installed banding. Additionally, air flow studies revealed the need to install air flow stabilizers at the exit of the inner air zones to ensure more stable combustion profiles and help protect vulnerable burner components.

Short of complete register replacement, many of the same corrections were made on the Unit 2 burners. Unit 2 burners were experiencing the same problems as Unit 1, but were at a less advanced state of degradation. With the improvements later made on Unit 2 burners, Unit 2 has performed satisfactorily to-date. Replacement of Unit 2 burners, based on current inspections, is still a matter of years away.

Burner integrity and operability, especially on Unit 1, have stabilized. Only a minor amount of repair is typically required each outage to maintain these burners in good condition. An average of four to six stabilizers are replaced on each unit, each major outage. IPSC has developed an in-house design for these stabilizers using more durable, but less expensive, metal incorporating rare earth additives. Instead of buying stabilizers on contract for $2800 each, they are now built on-site for approximately $350 each.